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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/739,622	12/20/2000	Thomas J.M. Castenmiller	PM 275503 P-0166010 US	4742

909 7590 07/18/2002

PILLSBURY WINTHROP, LLP
P.O. BOX 10500
MCLEAN, VA 22102

EXAMINER
HO, ALLEN C

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 07/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/739,622	CASTENMILLER ET AL.	
	Examiner	Art Unit	
	Allen C. Ho	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 June 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12 and 14-17* is/are rejected.

7)☒ Claim(s) *11 and 13* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 December 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the position detecting device in claim 17 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3, 6, 7, 10, 12, 14, 15, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (U. S. Patent No. 5,243,195) in view of Ferraro *et al.* (1994).

Nishi disclosed a lithographic projection apparatus (Fig. 2) and a method of manufacturing a device comprising: a projection beam illumination system which supplies a projection beam of radiation (inherent); a first object table (**RST**) for holding a projection beam patterning device (**PA**) which patterns the projection beam according to a desired pattern; a second object table (**WST**) for holding a substrate (**W**); a projection system (**PL**) which images the patterned beam onto a target portion of the substrate; a reference frame (inherent); three position detection devices (**IFX**, **IFY1**, **IFY2**) comprising: collimated laser sources (in the

interferometers); radiation detectors mounted in a fixed position on the reference frame (in the interferometers); mirroring devices ($\mathbf{IM_X}$, $\mathbf{IM_Y}$) mounted on one of the object tables that is moveable relative to the reference frame so as to reflect laser beam emitted by the laser sources toward the radiation detectors.

However, Nishi did not teach that: (1) the radiation detector is a two-dimensional PSD, or a CCD, or a four-quadrant photo-detector; and (2) the radiation source mounted on one of the object tables; a two-dimensional radiation detector mounted in a fixed position; and a mirroring device that is movable relative to the reference frame so as to reflect radiation emitted by the radiation source toward the radiation detector.

Ferraro *et al.* taught that a two-dimensional CCD has the advantages of having low readout noise and high quantum efficiency and sensitivity in a wide wavelength range.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ: (1) a two-dimensional CCD for light detection for the above-mentioned advantages; and (2) a position detecting device with the above-mentioned configuration, since a person in the art would choose to implement from among the known equivalents based solely on design choice absent any showing of criticality; the lack of criticality is demonstrated by applicant's claiming of a plurality of equivalent devices.

4. Claims 1-4, 6, 7, 8, 10, 12, 14, 15, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van Den Brink (U. S. Patent No. 5,801,832) in view of Ferraro *et al.* (1984).

Van Den Brink disclosed a lithographic projection apparatus (Fig. 1) and a method of manufacturing a device comprising: a projection beam illumination system which supplies a

projection beam of radiation (**LA**); a first object table (inherent) for holding a projection beam patterning device (**MA**) which patterns the projection beam according to a desired pattern; a second object table (**WC**) for holding a substrate (**W**); a projection system (**PL**) which images the patterned beam onto a target portion of the substrate; a reference frame (inherent); three position detection devices (**73**, **74**, **75**) comprising: collimated laser source (**70**); radiation detectors (**76**, **77**, **78**) mounted in a fixed position on the reference frame; mirroring devices ($\mathbf{R_1}$, $\mathbf{R_2}$) such as trapezoid retro-reflectors (**106**, **107**) mounted on one of the object tables that is moveable relative to the reference frame so as to reflect laser beam emitted by the laser sources toward the radiation detectors.

However, Van Den Brink did not teach that: (1) the radiation detector is a two-dimensional PSD, or a CCD, or a four-quadrant photo-detector; and (2) the radiation source mounted on one of the object tables; a two-dimensional radiation detector mounted in a fixed position; and a mirroring device that is movable relative to the reference frame so as to reflect radiation emitted by the radiation source toward the radiation detector.

Ferraro *et al.* taught that a CCD has the advantages of having low readout noise and high quantum efficiency and sensitivity in a wide wavelength range.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to employ: (1) a two-dimensional CCD for light detection for the above-mentioned advantages; and (2) a position detecting device with the above-mentioned configuration, since a person in the art would choose to implement from among the known equivalents based solely on design choice absent any showing of criticality; the lack of criticality is demonstrated by applicant's claiming of a plurality of equivalent devices.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishi (U. S. Patent No. 5,243,195) and Ferraro *et al.* (1994) as applied to claim 1 above, and further in view of Gallagher (U. S. Patent No. 5,811,816).

Nishi disclosed a lithographic projection apparatus (Fig. 2) comprising laser sources. However, Nishi did not teach that the laser source is mounted away from the reference frame, beam directing optics mounted on the reference frame, and an optical fiber to couple the laser source to the beam directing optics. Gallagher *et al.* disclosed an interferometer comprising a laser diode (**105**) coupled to an optical fiber (**102**). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to introduce a laser beam using an optical fiber, since a person would be motivated to introduce a laser beam into a confined area where a laser diode would not fit.

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Van Den Brink (U. S. Patent No. 5,801,832) and Ferraro *et al.* (1994) as applied to claim 1 above.

Van Den Brink disclosed a lithographic projection apparatus (Fig. 1) comprising a retro-reflector. However, Van Den Brink did not teach that the retro-reflector is one of a trapezoid retro-reflector and a retro-reflector comprising a convergent lens and a reflective surface. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to choose from among the known equivalents based solely on design choice absent any showing of criticality. The lack of criticality is demonstrated by applicant's claiming of a plurality of equivalent devices.

Allowable Subject Matter

7. Claims 11 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter:

The allowable subject matter refers to an incremental position sensing device to detect a position of the moveable object table in a detection range wider than that of the position detection device and a combiner which combines output signals from the incremental position sensing device and the position detector to determine an absolute position of the object table in the detection range.

Response to Arguments

9. Applicant's arguments filed 14 June 2002 have been fully considered but they are not persuasive.

A CCD is a two-dimensional radiation detector.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

(1) Van Der Werf *et al.* (U. S. Patent No. 6,046,792) describe differential interferometer system.

(2) Kakizaki *et al.* (U. S. Patent No. 6,040,096) describe a projection exposure apparatus comprising position detection devices.

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (703) 308-6189. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached at (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0530.

Allen C. Ho
Examiner
Art Unit 2882

ACH
July 8, 2002

ROBERT H. KIM
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800